

M&M's Community and Geo-Spatial Thinking

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Purpose: To ease the students into the basic concepts of geo-spatial thinking, an activity utilizing a white sheet and M&M's will engage interest and make a connection between existing knowledge and real-life geo-technology possibilities.

Grade Level(s): 4-12

National Geography Standards:

1. How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective.
18. How to apply geography to interpret the present and plan for the future.

Indiana Social Studies Academic Standards:

Fifth Grade: Individuals, Society, and Culture – 5.5.6.

Sixth Grade: Geography – 6.3.2.

Seventh Grade: Geography – 7.3.3; Individuals, Society, and Culture – 7.5.4 (focusing on geo-spatial technologies in the late 20th century and the 21st century).

Eighth Grade: Geography – 8.3.11 (expand this activity to focus on specific standard goals); Individuals, Society, and Culture - 8.5.7.

High School: World Geography – 1.3 and 1.4.

Geography and History of the World - 5.4 and 5.5.

Objectives:

Upon completion of this activity, students will be able to...

1. Create a two-dimensional map highlighting at least four pieces of data (layers of information).
2. Discuss the relationship between hand-cartography and 21st century cartography specifically comparing data collection, data manipulation, and data presentation.
3. Give examples of geographic (spatially distributed) data (layers of information); ie., sewer lines, street lights, schools, grocery stores, libraries, bus stops,...
4. Identify GIS (Geographic Information Systems) and briefly explain the term: information technology systems used to store, analyze, manipulate, and display a wide range of geographic information.
5. State at least one way in which GIS has impacted society in the 21st century (ie-economic efficiency and development, emergency services, disaster recovery, etc.)
6. Give one example in which GIS may facilitate problem solving in the near future.

Materials Required:

- One white twin sheet or large white paper (butcher or bulletin board paper)
- One large bag of multi-colored M&M's or other candies/figures
- Pencils for each student
- White drawing paper for each student

Procedures:

1. Place the white sheet onto the floor of the classroom.
2. Hand each bag of sorted M&M's to a student.
3. Discuss with the students that they will be gathering geographic (spatial) information about a community. Six pieces of information have been requested: water-lakes and ponds, parks, fire stations, schools, large factories, fast-food restaurants. The students will "create" the community, obtain the data requested about the community, and briefly map the data obtained.
4. The student with the blue M&M's will gently "toss" the M&M's onto the white sheet. The blue M&M's represent water-lakes and ponds.

5. The student with the green M&M's will follow, along with subsequent colors until all of the M&M's are distributed onto the white sheet. The M&M's could represent the following, or the students could select the item that will be represented.

Green = parks

Red = fire stations

Yellow = schools

Brown = large factories

Orange = fast food restaurants

Note: Black yarn, string, or even licorice could be used to add streets as another layer.

6. As the class is viewing the newly created "community", discuss with the students that each M&M color represents one layer of information or data. All of the layers combined tell a partial story about the community, and the data can be used to answer questions about the community and to solve problems.
7. Next, have each student draw an inexact map of the "community". On the map should be a crude representation of the location of the various layers of data, the title (M&M Community), a map key (identifies the items represented on the map), a date, a compass rose, and their name (as cartographer). The map does not need to be perfect, but this will demonstrate to the students a more traditional method of map-making in a fun way. Of course, extra M&M's can be provided for a snack! (This portion of the activity could be done in small groups.)
8. Follow this activity with a discussion about their community. Have students imagine the time it would take for them to walk the community and to hand-map everything. How could the data collection be performed more quickly? How could mapping be performed faster? This is the time to discuss the use of technology to obtain, manage, and manipulate data to prepare maps, bar graphs, pie charts, and reports to answer questions about a community. Instead of the hand-collection of data, hand-mapping, and slow analysis (which could take weeks), new technology (geo-spatial – of the Earth from a spatial perspective) enables students and users to solve problems more efficiently. Prepare the students for the impending adventure into the 21st century use of technology. Introduce the term GIS. Discuss a few examples of possible GIS use in the local community. Discuss the future of GIS use to even more rapidly obtain data, analyze data, and devise solutions. Examples: locate areas where a health service facility is needed; identify regions of language barrier access to services; propose a better city bus route for a community that would be attractive to the bus company. To show students how GIS directly impacts them, explain that the school bus routes are determined using GIS data to create the most efficient routes.
9. Possible Assignment: Have students play the role of Entrepreneur. Ask them what business they would like to start in their community and have them make a development plan/list answering key questions like: Where would you locate your business and why there? What type of site/space needs would you have? Are there zoning issues? Who would your buyers/consumers be? What employee needs would you have? Do you have any transportation needs (ie-for your product)? Where is your primary market? Who would your primary competition be? Have the students make a list of the data they might need for their decision-making process (ie-location of key competitor). How might they use GIS to assist them?

Assessment / Evaluation:

1. Completion of the hand-drawn "M&M Community" map: accuracy and completion indicating comprehension, essential parts of a map.
2. Positive interaction within the small groups. (If applicable.)
3. Starting their own business activity. (If applicable.)